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PROCEEDINGS
OF
THE ROYAL SOCIETY.

1839.

No. 39.

May 30, 1839.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

Professors Christopher Hansteen, Macédoine Melloni, Lambert Adolphe Jacques Quételet and Felix Savart, were severally elected Foreign Members of the Society.

Edward Davies Davenport, Esq., James Orchard Halliwell, Esq., Gilbert Wakefield Mackmurdo, Esq., and the Venerable Charles Thorp, D.D., were balloted for, and duly elected into the Society.

John Howship, Esq., was balloted for, but not elected into the Society.

The reading of a paper entitled, "Fifth letter on Voltaic Combinations; with some account of the effects of a large Constant Battery: addressed to Michael Faraday, Esq., D.C.L., F.R.S., Fullerian Professor of Chemistry in the Royal Institution of Great Britain. By John Frederic Daniell, Esq., F.R.S., Professor of Chemistry in King's College, London," was resumed and concluded.

The author, pursuing the train of reasoning detailed in his preceding letters, enters into the further investigation of the variable conditions in a voltaic combination on which its efficiency depends; and the determination of the proper proportions of its elements for the economical application of its power to useful purposes. He finds that the action of the battery is by no means proportioned to the surfaces of the conducting hemispheres, but approximates to the simple ratio of their diameters; and hence concludes that the circulating force of both simple and compound voltaic circuits increases with the surface of the conducting plates surrounding the active centres. On these principles he constructed a constant battery consisting of seventy cells in a single series, which gave, between charcoal points separated to a distance of three-quarters of an inch, a flame of considerable volume, forming a continuous arch, and emitting radiant heat and light of the greatest intensity. The latter, indeed, proved highly injurious to the eyes of the spectators, in which, although they were protected by grey glasses of double thickness, a state of very active inflammation was induced. The whole of the face of the author became scorched and inflamed, as if it had been exposed for many hours to a bright midsummer's sun.

The rays, when reflected from an imperfect parabolic metallic mirror in a lantern, and collected into a focus by a glass lens, readily burned a hole in a paper at a distance of many feet from their source. The heat was quite intolerable to the hand held near the lantern. Paper steeped in nitrate of silver and afterwards dried, was speedily turned brown by this light: and when a piece of fine wire-gauze was held before it, the pattern of the latter appeared in white lines, corresponding to the parts which it protected. The phenomenon of the transfer of the charcoal from one electrode to the other, first observed by Dr. Hare, was abundantly apparent; taking place from the *zincode* (or positive pole,) to the *platinode*, (or negative pole). The arch of flame between the electrodes was attracted or repelled by the poles of a magnet, according as the one or the other pole was held above or below it: and the repulsion was at times so great as to extinguish the flame. When the flame was drawn from the pole of the magnet itself, included in the circuit, it rotated in a beautiful manner.

The heating power of this battery was so great as to fuse, with the utmost readiness, a bar of platinum, one-eighth of an inch square: and the most infusible metals, such as pure rhodium, iridium, titanium, the native alloy of iridium and osmium, and the native ore of platinum, placed in a cavity scooped out of hard carbon, freely melted in considerable quantities.

In conclusion, the author briefly describes the results of some experiments on the evolution of the mixed gases from water in a confined space, and consequently under high pressure; with a view to ascertain, first, in what manner conduction would be carried on, supposing that the tube in which the electrodes were introduced were quite filled with the electrolyte, and there were no space for the accumulation of the gases; secondly, whether, decomposition having been effected, recombination would take place at any given pressure; and lastly, whether any reaction on the current-force of the battery would arise from the additional mechanical force which it would have to overcome. These experiments he purposes pursuing at some future time.

A paper was also read, entitled, "An experimental inquiry into the influence of nitrogen in promoting vegetable decomposition, and the connexion of this process with the growth of plants." By Robert Rigg, Esq. Communicated by the Rev. J. B. Reade, A.M., F.R.S.

The author considers it as a general fact, to which there are very few if any exceptions, that vegetable bodies in the state in which they are produced in nature, undergo spontaneous decomposition when kept under circumstances favouring such an action; and that, from the decomposition of each, compound products peculiar to that substance result. A variety of experiments are detailed and tabulated; the first series of which contains those made on solutions of compounds, such as sugar, honey and extract of malt, showing that in each the amount of spontaneous decomposition is in proportion